REMARKS

The Examiner is thanked for the Official Action dated December 16, 2002. The above amendment and remarks to follow are intended to be fully responsive thereto.

The drawings were objected to because Figure 1 was not labeled by a legend such as --Prior Art--, because page 5, lines 13-20 cite Figure 1 as conventional. Drawing figure 1 has been corrected in red ink to label thereof by a legend --Prior Art--, thus overcoming this objection. No new matter has been added.

Claims 1-9 were objected to because of the minor informalities. Claims 1-9 have been amended, thus rendering this objection moot. No new matter has been added.

Claims 1 and 7-9 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 7-9 have been amended, thus rendering this rejection moot. No new matter has been added.

Claims 7 and 9 were rejected under 35 U.S.C. 102(b) as being anticipated by Mizuno (US 6,073,689). The applicant respectfully disagrees.

However, in order to expedite the procecution of the present application, claim 7 has been amended to further define the invention over the prior art of record, by reciting that the control unit further comprises the means for reducing the drive frequency if the torque requirement exceeds a first threshold and increasing the drive frequency if the torque requirement becomes lower than a second threshold. The support for this amendment may be

found on page 8, lines 1-16 of the present application. No new matter has been added.

The actuator control apparatus of Mizuno fails to disclose (1) means for supplying the control unit with information representing torque requirements, and (2) a means for reducing the drive frequency if the torque requirement exceeds a first threshold and increasing the drive frequency if the torque requirement becomes lower than a second threshold, as recited in the amended claim 7.

The Examiner erroneously alleges that Mizuno discloses "means to supply the control unit with torque information (Control unit [Fig. 1, #26] determines the torque level and performs processing according to Fig. 4, Step 310)". In fact, Mizuno clearly discloses that "decision is made in regard to a change in the source voltage (VB) applied to the actuators in step 300, as illustrated in FIG. 4" (emphasis added). In other words, the decision-making in the step 310 is performed in conformance to a characteristic curve having two decisions α and β that incorporate hysteresis at the values of source voltages V1 (9V) and V2 (9.5V) and having two decisions β and γ that incorporate hysteresis at the values of source voltages V3 (11.8V) and V4 (12.3V) (see column 6, lines 44-59).

Furthermore, the actuator control apparatus of Mizuno clearly lacks the means for reducing the drive frequency if the torque requirement exceeds a first threshold and increasing the drive frequency if the torque requirement becomes lower than a second threshold.

Therefore, claims 7 and 9, as amended, define the invention over Mizuno, and are in condition for allowance.

Claims 1 and 2 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of Boillat (4,791,345). The Applicant respectfully disagrees.

Regarding claim 1: First, contrary to the Examiner's allegation, Mizuno fails to disclose the steps of delivering to the stepper motor a power-supply voltage at a drive frequency in response to an actuation command; continuously gathering an information representing torque requirements for torque delivered by the stepper motor in order to shift the flap; supplying the control unit with the information representing torque requirements; and reducing the drive frequency of the power-supply voltage in response to a detected increase in the torque requirements; and increasing the drive frequency of the power-supply voltage in response to a detected reduction in the torque requirements. Instead, Mizuno clearly discloses that decision is made in regard to a change in the source voltage (VB) applied to the actuators. Then, depending on the source voltage (VB) applied to the actuators, the drive torque and the drive frequency are set.

Second, the Examiner erroneously alleges that claim 1 recites just increasing the drive frequency if the drive frequency is below a predetermined maximum frequency. In fact claim 1 recites increasing the drive frequency in response to the detected reduction in the torque requirements when the drive frequency is below a predetermined maximum frequency.

Boillat fails to disclose increasing of the frequency of the stepping motor until a predetermined maximum driving frequency of f_{max} is reached in response to a detected reduction in the torque requirements. In fact, Boillat discloses that the driving frequency of the

stepping motor is changed steadily and continuously either during switching on or switching off of the stepping motor (see column 6, lines 48-51).

Therefore, even if the combination and modification of Mizuno and Boillat, suggested by the Examiner, could be made, the resulting method for controlling the stepper motor still would lack the step of increasing the drive frequency of the power-supply voltage in response to a detected reduction in the torque requirements when the drive frequency is below a predetermined maximum frequency.

Moreover, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitation must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (MPER 2143.03). Clearly, prior art references cited by the Examiner lack any motivation or suggestion to provide the method of Mizuno with the teachings of Boillat.

Therefore, the Examiner's conclusion that employing the process of switching the stepping motor on or off as taught by Boillat in the method of Mizuno is obvious *per se*, is improper, and claims 1 and 2 further define the invention over the prior art.

Claims 3, 4 and 6 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of Boillat as applied to claim 1 above, and further in view of Holdaway (6,016,044). The Applicant respectfully disagrees.

Regarding claims 3 and 4: The Examiner erroneously alleges that Holdaway discloses driving the step motor in a near-continuous motor to exponentially increase the motor's drive frequency. In fact, the step motor of Holdaway uses the technique known as "microstepping" that is a means of driving a motor through a step with a series of current magnitude states that

generate smaller angular displacements of the motor magnetic field vector position. The sum of these displacements equals that of one step. Thus, Holdaway fails to disclose the step of varying the drive frequency in a near-continuous way as a function of the fluctuations in the detected torque requirements.

Regarding claim 6: The Examiner erroneously alleges that Holdaway discloses torque values represented as instantaneous torque. In fact, Holdaway just mentions that instantaneous torque is approximately a sinusoidal function of the angular displacement of a motor's field vector position from its rotor position, a smaller angular displacement results in a lower instantaneous torque, and that a lower instantaneous torque generates an angular acceleration at the leading edge of each "microstep" smaller than that which would be generated at the leading edge of each step in "full step" drive mode. The effect is to spread the large acceleration that normally occurs at the beginning of a step over the entire step as a series of small accelerations, thus reducing the level of acoustic noise. Holdaway fails to disclose that information representing torque requirements of the stepper motor is gathered by detecting the instantaneous torque delivered by the motor.

Therefore, the Examiner's allegation that claims 3, 4 and 6 are obvious over Mizuno in view of Boillat as applied to claim 1 above, and further in view of Holdaway, is improper, and claims 3, 4 and 6 further define the invention over the prior art.

Claim 5 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of Boillat as applied to claim 1 above, and further in view of Bartel (5,762,384). The Applicant respectfully disagrees.

First, claim 5 depends upon claim 1 which, as argued above, defines the invention over the prior art of record and is in condition for allowance.

Second, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitation must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (MPER 2143.03). Clearly, prior art references cited by the Examiner lack any motivation or suggestion to provide the method of Mizuno with the teachings of Boillat and Bartel.

Therefore, the rejection of claim 5 under 35 U.S.C. 103(a), is improper, and claim 5 is in condition for allowance.

Claim 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno as applied to claim 7 above, and further in view of Boillat. The Applicant respectfully disagrees.

As argued above regarding the rejection of claim 7, claim 7, as amended, defines the invention over Mizuno, and is in condition for allowance. Furthermore, Boillat fails to disclose increasing of the frequency of the stepping motor when the drive frequency is below a predetermined maximum driving frequency of f_{max} is reached in response to a detected reduction in the torque requirements. In fact, Boillat discloses that the driving frequency of the stepping motor is changed steadily and continuously either during switching on or switching off of the stepping motor (see column 6, lines 48-51).

Moreover, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitation must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (MPER 2143.03). Clearly, prior art references cited by the

Examiner lack any motivation or suggestion to provide the method of Mizuno with the teachings of Boillat

Therefore, claim 8 defines the invention over the prior art and is in condition for allowance.

Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

It is respectfully submitted that claims 1-9, as amended, define the invention over the prior art of record and are in condition for allowance, and notice to that effect is earnestly solicited. Should the Examiner believe further discussion regarding the above claim language would expedite prosecution they are invited to contact the undersigned at the number listed below.

Respectfully submitted:

By: 
Matthew W. Stavish
Reg. No. 36,286

Liniak, Berenato & White
Suite 240
6550 Rock Spring Drive
Bethesda, Maryland 20817
(301) 896-0600

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	BRUZY et al.
Appl. No.	:	10/052,517
Filed	:	January 23, 2002
Title	:	OPTIMIZED CONTROL OF FLAP ACTUATOR OF A MOTOR VEHICLE AIR-CONDITIONING INSTALLATION
Group Art Unit:		2837
Examiner	:	MILLER, P.
Docket No.	:	01200.566

****

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 1-9 have been amended as follows:

1. Method for [control of] controlling a flap-actuator stepper motor provided for actuating a flap of a motor-vehicle air-conditioning installation, the stepper motor is controlled by a controlling unit, the method comprising the steps of:

actuating the stepper motor;

delivering to the stepper motor a power-supply voltage at a drive frequency in response to an actuation command;

[characterised in that, during the actuation of the flap, information is] continuously gathering an information representing [the] torque requirements for torque delivered by the stepper motor [(112)] in order to shift the flap[,];

supplying the control unit with the information representing the torque requirements; and

reducing the drive frequency of the power-supply voltage [the drive frequency is reduced, if appropriate,] in response to a detected increase in the torque requirements; and[,]

increasing the drive frequency of the power-supply voltage in response to a detected reduction in the torque requirements when the drive frequency is below a predetermined maximum frequency [, the drive frequency is increased, if appropriate, in response to a detected reduction in the torque requirements].

2. Method according to Claim 1, [characterised in that,] wherein in response to [an] the actuation command, the operation of the stepper motor is initially ordered at the predetermined maximum frequency.

3. Method according to Claim 1, [characterised in that] wherein the drive frequency is made to vary in a near-continuous way as a function of [the] fluctuations in the detected-torque requirements.

4. Method according to Claim 1, [characterised in that] wherein the drive frequency is made to vary in steps, the move from one step to another being ordered in response to the crossing of a threshold by the detected-torque requirements.

5. Method according to Claim 1, [characterised in that] wherein the motor is fed in over-powered mode.

6. Method according to Claim 1, [characterised in that] wherein the information is gathered representing the torque requirements by detecting a quantity representative of the instantaneous torque delivered by the motor.

7. Flap actuator for a motor-vehicle air-conditioning installation, the flap actuator comprising:

a stepper motor (112) for driving [the] a flap,

an electrical power-supply circuit (104) for the motor,

a control input (102) and a control unit (100) linked to the control input and to the electrical power-supply circuit (104) for delivering to the stepper motor (112) a power-supply voltage at a given frequency in response to an actuation command received on the control input (102), [characterised in that:] and

[-] a means (120) [are provided] for supplying the control unit (100) with information representing [the] torque requirements which the motor (112) has to deliver in order to shift the flap, [and] wherein

[-] the control unit (100) comprises a means for adapting the drive frequency of the stepper motor on the basis of the [said] information representing the torque requirements, and

a means for reducing the drive frequency if the torque requirement exceeds a first threshold and increasing the drive frequency if the torque requirement becomes lower than a second threshold.

8. Actuator according to Claim 7, [characterised in that] wherein the control unit (100) further comprises a means for reducing the drive frequency in response to a detected increase in the torque requirements and a means for increasing the drive frequency in response to a detected reduction in the torque requirements when the drive frequency is below a predetermined maximum frequency acting in response to the reception of the [said] information representing the torque requirements[, in order, if appropriate, to reduce the drive frequency in response to a detected increase in the torque requirements and, when the drive frequency is below a predetermined maximum frequency, to increase the drive frequency, if appropriate, in response to a detected reduction in the torque requirements].

9. Motor-vehicle air-conditioning installation, [characterised in that it] wherein the installation comprises at least one actuator according to Claim 7.